Weather and Climate

GEOL 1340 – 001 (Lecture)
GEOL 1340 – 011 (Lab)

Syllabus & Schedule for Spring 2018

Instructor Information

Instructor:	Taylor M. Hughlett, Ph.D.
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Office Telephone:	817-272-2738
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Faculty Profile:	https://mentis.uta.edu/explore/profile/taylor-hughlett
Office Hours:	Monday 11:00 am – 12:00 pm

Course Information

Lecture:	GEOL 1340 – 001, MW, 1:00 pm – 1:50 pm, GS 233
Lab:	GEOL 1340 – 011, W, 2:00 pm – 3:20 pm, GS 104

Required Textbook: Meteorology: Understanding the Atmosphere 4th Ed, Ackerman and Knox, Jones & Bartlett Learning, ISBN: 978-1-284-03080-8

Supplemental Textbook: Weather Studies: Introduction to Atmospheric Science 6th Ed, American Meteorological Society, ISBN: 978-1-940033-41-9

Course Description

Nature and variability of weather and climate, including wind, temperature, clouds and precipitation, droughts and flooding. Storm systems, fronts, thunderstorms, tornadoes, hurricanes. Atmospheric chemistry and air pollution. Mean climate, seasonal variations and climatic change.

Student Learning Outcomes

After completion of this class, students will be familiar with the key terminology pertaining to weather and climate and will have a well-rounded understanding of the major weather events (e.g. hurricanes) as well as complex interactions of the atmosphere with the various components of the climate system, for example ocean and land. Students will be able to:

- Identify methods suitable to weather and climate monitoring (remote sensing, radar, ground-base monitoring).
- Explain the theory of thermal structure of the atmosphere and of radiative transfer.
- Summarize the major physical properties of the atmosphere like pressure, humidity, and saturations
- Understand the feedbacks between atmospheric processes and processes in other components of the Earth's climate system (hydrosphere, terrestrial biosphere, cryosphere, and geosphere).
- Analyze the atmospheric circulation system (polar, westerly, and trade winds).
- Describe the principals involved in the development of frontal systems, supercell storms, and tornadoes.
- Evaluate the development of a tropical storm (hurricane) and its threat to the southeast U.S. coast.
- Explain the cause and impact of large-scale climate variations like El Niño.
- Understate weather and climate forecasting, and data assimilation techniques.
- Identify major factors leading to climate change and assess future climate projections.

- Discuss the societal relevance of weather and climate change for global initiatives and political decisions.

This knowledge will enable the students to better understand topics of great societal importance, such as extreme weather events and future climate change, pollution, and environmental sustainability.

Critical Thinking Skills: Critical thinking skills in the area of atmospheric sciences will be trained through weather forecast and experimental meteorology in the classroom, a fieldtrip to the National Weather Service, and through discussions and exercises in lecture and labs. The assessment of the critical thinking skills in atmospheric sciences will be done by a key (signature) assignment that is related to climate change. The goal is to learn and understand key processes in atmospheric science and feedbacks of the climate system in response to natural and anthropogenic perturbations.

Communication Skills: Communications skills will be assessed through scientific discussions in lecture, laboratory, and field. An oral presentation as part of the signature project will be used to assess the communication skills.

Teamwork: Teamwork will be promoted in lecture and lab through discussion and review of the lecture material and through empirical and quantitative laboratory exercises. The teamwork skills will be assessed by the signature project.

Empirical and Quantitative Skills: Quantitative skills are trained in lecture and labs with analysis of the current weather situation and short-term prediction. The assessment of the quantitative skills is performed through classical problem solving (e.g. stability and humidity calculations) and through on-line forecast tools to assess weather and climate change.

Students will be guided to design experiments (e.g. radar case studies) and compare quantitative estimates in the signature project with observations.

Expectations for Out-of-Class Study

A general rule of thumb is this: for every credit hour earned, a student should spend 3 hours per week working outside of class. Hence, a 3-credit course might have a minimum expectation of 9 hours of reading, study, homework, etc.

Course Policies and Grading

Grading:

Lecture Portion:	70% of course
Lab Portion including signature project:	30% of course
Lab Portion:	
Signature Project	15% of course
Lab Assignments (10)	15% of course
Lecture Portion:	
Quizzes (4)	5% of course (Best 3)
Exams (3)	50% of course (~16.67% each)
Final Exam (1)	15% of course

Final grade calculation:
0.3 x lab + 0.05 x quizzes + 0.5 x exams + 0.15 x final
Score will be translated into a grade based on class average.

Grades will not be released over the phone or by email. Grades must be either obtained in person or from the UTA online database.

Exams: Exams will be mostly multiple-choice questions. No early exams are allowed.

Exams must be taken at the scheduled time. Make-up exams can only be taken in cases of illness or family emergency. A note from the University disciplinary officer or doctor may be required in these cases. Students who do not take an exam receive zero points as a grade on that exam. Make-up exams are scheduled and set by the instructor.

Quizzes: Lecture quizzes are not announced. The 3 best quizzes will be counted towards the total grade. There are no make-up quizzes.

Weather and Climate Project (signature project): A signature research assignment in the area of weather and climate is part of the core curriculum assessment and is designed to stimulate critical thinking skills, teamwork, communication and empirical and quantitative skills. Weather and climate data (e.g. temperature, precipitation) will be gathered for the field project and analyzed in a research report. Total length of the report for each team will be four pages, letter size, single-spaced, 12 pt Times New Roman font including graphs and references. Each team will give a 10-minute presentation on their project.

Extra Credit Field Trip: This semester we are lucky to be invited out to the National Weather Service Fort Worth for a tour of their facilities. Students who decide to go on this field trip can receive up to 20 points extra credit for the lab portion of the course (remember lab scores cap at 100%). To receive credit for the trip, the student must write a 1-page report summarizing the trip and one thing they enjoyed learning about at NWS Fort Worth. Total length of the report for each team will be 1 page, letter size, single-spaced, 12 pt Times New Roman font.

Homework: Ten homework assignments as part of the lab section will be given throughout the semester. Maximum average grade of labs will be no more than 100%. Late labs are accepted at a 20% penalty for 5 days. At the end of the 5th day, the grade is a zero.

Teamwork: Teamwork is encouraged to stimulate scientific discussion in lecture and lab. Teamwork is allowed in the lab and for the signature project.

Attendance: Attendance is required and may be taken occasionally. Lack of attendance may influence the final grade.

Grade Grievances

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog:
http://catalog.uta.edu/academicregulations/grades/#undergraduatetext
for graduate courses, see
http://catalog.uta.edu/academicregulations/grades/#graduatetext.

Drop Policy

GEOL 1340 consists of a lecture portion and a lab portion. To drop the lab, you must drop the whole course. Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and

Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

> **The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.
>
> **Counseling and Psychological Services, (CAPS)** www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/.

Lab Safety Training

Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities**.** Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this

University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Electronic Communication

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week

The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit by following the exit signs. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.
Students should also be encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at https://mavalert.uta.edu/ or https://mavalert.uta.edu/register.php

Student Support Services

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

The IDEAS Center (2nd Floor of Central Library) offers **free** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

The English Writing Center (411LIBR):
The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, workshops, and specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Library Home Page library.uta.edu
Librarian to Contact: Andy Herzog,
Ph.: 817-272-7517, Email: amherzog@uta.edu, Office: Central Library, 516B

Resources for Students

Academic Help
Academic Plaza Consultation Services library.uta.edu/academic-plaza
Ask Us ask.uta.edu/
Library Tutorials library.uta.edu/how-to
Subject and Course Research Guides libguides.uta.edu
Subject Librarians library.uta.edu/subject-librarians
Resources
A to Z List of Library Databases libguides.uta.edu/az.php
Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do
FabLab fablab.uta.edu/
Special Collections library.uta.edu/special-collections
Study Room Reservations openroom.uta.edu/
Teaching & Learning Services for Faculty
Copyright Consultation library-sc@listserv.uta.edu
Course Research Guide Development, Andy Herzog amherzog@uta.edu or your subject librarian
Data Visualization Instruction, Peace Ossom-Williamson peace@uta.edu
Digital Humanities Instruction, Rafia Mirza rafia@uta.edu
Graduate Student Research Skills Instruction, Andy Herzog amherzog@uta.edu or your subject librarian
Project or Problem-Based Instruction, Gretchen Trkay gtrkay@uta.edu
Undergraduate Research Skills Instruction, Gretchen Trkay gtrkay@uta.edu or your subject librarian.

Schedule for Spring 2018

Date	Topic*	Chapters	Lab
Jan 17	• Course Introduction • Introduction to the Atmosphere	1	-
Jan 22 - 24	• The Energy Cycle	2	1
Jan 29 - 31	• Temperature • Water in the Atmosphere	3 & 4	2
Feb 5	Exam 1	1-4	-
Feb 7 - 12	• Observing the Atmosphere	5	3
Feb 14 - 19	• Atmospheric Forces and Wind • Global Scale Wind	6 & 7	4
Feb 21 – 26	• Atmosphere-Ocean Interactions: El Nino and Tropical Cyclones	8	5
Feb 28 – Mar 5	• Air Masses and Fronts	9	6
Mar 7	Exam 2	5-9	-
Mar 12 – 16	NO CLASS - Spring Break		
Mar 19 - 21	• Extratropical Cyclones and Anticyclones • Thunderstorms and Tornadoes	10 & 11	7
Mar 26 - 28	• Small Scale Winds	12	8
Apr 2 - 4	• Weather Forecasting	13	9
Apr 9	Exam 3	10-13	-
Apr 11 - 16	• Past and Present Climates	14	10
Apr 18 - 23	• Human Influences on Climate	15	SP
Apr 25 – 30	• Climate Forecasting	16	SP
May 2	Signature Project Presentations		
May 7, 2018	Final Exam 11:00 am – 1:30 pm GS 233	1-16	-

*The topics covered in this course are subject to change at any point by the instructor, and the schedule can be adjusted accordingly.